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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OFFICIAL

In re Application of:

Michael P. Hanratty

Serial No.: 10/683,272

Filed: June 25, 2003

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) Examiner:  
)  
) Group Art Unit:  
)  
) Confirmation No.:

For: SYSTEMS AND METHODS FOR GENERATING HIGH VOLUMES OF FOAM

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**PETITION TO MAKE SPECIAL UNDER  
37 CFR 1.102(d) AND MPEP 708.02(VIII)**

Sir:

The applicant hereby petitions that the above-identified patent application, which has not received any examination by an Examiner, be made special pursuant to MPEP § 708.02, VIII. All claims in this case are directed to a single invention. If it is determined that all the claims presented herein are not directed to a single invention, then the applicant will make an election without traverse as a prerequisite to the grant of special status.

A pre-examination search was made by a professional searcher. The field of search, as required by MPEP 708.02(VIII)(C), is identified in the following table:

<u>CLASS</u>	<u>ASSOCIATED SUBCLASS</u>
169	014, 015
261	024
239	373


Submitted herewith is a transmittal of an Information Disclosure Statement and Form PTO-1449 citing relevant references. A detailed discussion of the references deemed most relevant is set forth in Attachment A hereto. Inclusion of a reference in the Information Disclosure Statement or Attachment A does not constitute an admission on the part of the applicants as to whether the reference is prior art for the purposes of assessing patentability under 35 U.S.C. §§ 102 and 103.

The fee required by 37 C.F.R. 1.17(h) is to be paid by the attached check for \$130.00. Any additional charges associated with the submission of this Petition may be charged to Deposit Account No. 11-0231.

Respectfully submitted,

Date: September 3, 2003

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I hereby certify that this correspondence is being deposited with the United States Postal Service first class mail in an envelope addressed to: Mail Stop \_\_\_\_\_, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on 9/3/03  
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Date of Signature

**ATTACHMENT A**  
**TO PETITION TO MAKE SPECIAL**

The following is a detailed discussion of the references believed to be most closely related to the subject matter encompassed by the claims and how the claimed subject matter is distinguishable over the references. Inclusion of a reference in this attachment does not constitute an admission on the part of the applicant as to whether the reference is prior art for the purposes of assessing patentability under 35 U.S.C. § 102 and/or 35 U.S.C. § 103.

**1. Discussion of the References**

- 1) **U.S. Patent No. 3,393,745 to Durstewitz** ("the '745 patent") describes a fire-fighting foam-generating apparatus. The apparatus includes a centrifugal fan, a cylindrical foam forming net surrounding the fan, a source of foam producing solution under pressure, and a plurality of reaction nozzles. The nozzles are mounted on the fan rotor for spraying the solution onto the net and for driving the fan rotor by the reaction forces thus produced to pump air outwardly through the net to generate high expansion foam.
- 2) **U.S. Patent No. 3,424,250 to Thomae** ("the '250 patent") describes an apparatus for entraining air in a mixture of water and detergent compound to form a foam and then further entraining air in the foam to achieve its high expansion for use in fire fighting. The foam is produced with the use of a conically-shaped nylon mesh net.
- 3) **U.S. Patent No. 3,607,779 to King et al.** ("the '779 patent") describes a tubular housing with a rear inlet and a front end outlet that has a foraminous cover over its front end. A shaft extends lengthwise of the inside of the housing and is rotatably supported. It is driven by a water turbine on its front end, the turbine having an inlet for water under pressure and a central front outlet that delivers the water to a forwardly directed nozzle connected to the turbine. Rigidly mounted on the shaft behind the turbine is a fan for blowing air through the housing from back to front. Also mounted on the shaft is a pump for delivering foaming solution to the rear end of the nozzle to mix with the water from the turbine outlet.

4) **U.S. Patent No. 3,780,812 to Lambert** ("the '812 patent") describes a fire protection method and apparatus for generating high expansion foam. The method includes fluidizing the foams by wetting. The apparatus includes a housing having a source of foam solution under pressure and a source of water under pressure. The apparatus' housing includes a fan and a perforated member. The fan is positioned in the housing to provide air flow across the perforated member which is wetted by the foam solution to produce high expansion foam bubbles. The fan is driven by a plurality of nozzles mounted both for discharging the water under pressure and for wetting the foam bubbles.

5) **U.S. Patent No. 5,337,830 to Bowman** ("the '830 patent") describes a system for generating fire-fighting foam whereby a foam-forming chemical is mixed with water and air to create foam. The foam is pressurized preferably by the provision of pressurized air to force the foam out of a duct within which the foam is formed and to direct the foam at the seat of the fire or to the site to be protected against fire. A metal mesh is rotatable and preferably helical with respect to the direction of travel of the foam, which acts as a catalytic agent and helps to clear foam from the duct within which the foam forms.

6) **U.S. Patent No. 5,787,989 to Elmenhorst** ("the '989 patent") describes a fan casing and a fan which are operated by a reaction jet motor. The reaction jet motor has nozzles and is connected to a supply of liquid under pressure, usually water with a foaming agent added. When the liquid is sprayed from the nozzles, the reaction forces will operate the fan. The nozzles are designed in such a manner that they generate a cohesive and compact jet with high thrust. A grid is located between the nozzles and the foam net for atomization and dispersion of the liquid. The air blows the liquid through the foam net, thus generating fire-fighting foam.

7) **U.S. Patent No. 4,595,142 to Kawaharazuka et al.** ("the '142 patent") describes a blower/spray device which includes a tank containing a liquid chemical agent that is removably mounted on a main body, an air extracting line secured to the upper portion main body, and an air introducing member secured to the bottom wall of the tank and aligned with the outlet of the air extracting line. The blower is driven by an internal combustion engine.

## 2. The Claims are Patentable over the References

For at least the following reasons, the claimed subject matter is believed to be neither disclosed nor suggested in the references cited herein. Furthermore, although the prior art systems and methods described above (and other presently used systems and methods for foam generation) may result in adequate foam generation for the specific and limited purposes for which they are used, these prior art systems and methods fail to generate foam in a way and of a quality suitable for widespread and effective use. In contrast, the present application discloses systems and methods for foam generation that are capable of producing high volumes of foam that can be effectively and efficiently delivered when and where needed. In addition, the present application discloses systems and methods for foam generation that overcome the pressure-related limitations of conventional foam-generating systems.

Specifically, the subject application is directed to systems and methods for generating high volumes of foam, but at low pressure, which have a wide range of applications, including fire fighting and fire prevention fields. The foam may be effectively delivered to targets that have heretofore been difficult, if not impossible, to reach in a timely, cost effective and/or efficacious manner. Nozzles and nozzle-containing systems are provided for combining water, injected foam and air to generate and/or deliver high volume, low pressure foam. The foam generation systems may be part of portable units that may be worn or otherwise supported by a user (e.g., a back pack), manually transported (e.g., a push cart), or transported with power-assistance (e.g., a power-assist cart). The systems may also be vehicle-mounted. Exemplary nozzle systems include a diffuser unit that facilitates aeration of the water and foam mixture that is fed to the nozzle system. Further nozzle systems include a plurality of circumferentially arrayed nozzle jets directed toward a central axis of the housing for combination with an air flow that is fed thereto.

Independent claims 1 and 15 of the present application are directed to apparatuses for generating foam, which include a diffuser unit; a housing defining a central axis and having a proximal end, a distal end and an internal chamber within which is positioned the diffuser unit; a first conduit in communication with the proximal end of the housing for supplying a gaseous stream to the diffuser unit; a second conduit in communication with the proximal end of the

housing for supplying a water and foam mixture to the diffuser unit; and an outlet located at the distal end of the housing for expelling an aerated water and foam mixture from the housing. Independent claim 15 further requires a blower or compressor that discharges a gas flow into a first transport line, a second transport line in communication with a source of a mixture of water and foam; and a nozzle system for generating foam, said nozzle system being in communication with the first and second transport lines.

Independent claim 20 of the present application is directed to methods for generating high volume, low pressure foam, including the steps of providing a source of water and foam mixture; providing a source of air flow; feeding the water and foam mixture and the air flow to a nozzle system, said nozzle system including a diffuser unit for generating foam from said water and foam mixture and said air flow; and discharging the foam generated by said diffuser unit from said nozzle system.

Independent claim 33 of the present application is directed to apparatuses for generating foam including a housing defining a central axis and having a proximal end, a distal end and an internal chamber; a plurality of circumferentially arrayed nozzle jets positioned in the internal chamber of the housing and directed toward the central axis of the housing; a first conduit in communication with the proximal end of the housing for supplying a gaseous stream to the internal chamber; a second conduit in communication with the proximal end of the housing for supplying a water and foam mixture to the plurality of nozzles; and an outlet located at the distal end of the housing for expelling an aerated water and foam mixture from the housing.

1) The '745 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. Instead, the '745 patent describes forming foam by spraying water and detergent solution onto the net located around the fan, which constitutes a structure substantially different from the subject disclosure.

2) The '250 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. The '250 patent describes a foam-producing apparatus, in which entrapment of air in a foam mixture is accomplished by projecting it through a conically-shaped netting. The conically-shaped netting is a structure completely different from and much less efficient in producing foam than the diffuser unit or the plurality of circumferentially arrayed nozzle jets as defined and claimed in the present application.

3) The '779 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. In contrast, in the foam generator described in the '779 patent, the formation of bubbles takes place at a generally conically-shaped foraminous member or screen, when the air and the foaming solutions are blown through it. This arrangement is similar to that of the '250 patent and is substantially different from the subject application for the same reasons.

4) The '812 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. Instead, the '812 patent describes a foam-generating method and apparatus, wherein a fan is positioned in a housing to provide air flow across a planar perforated member, which at the same time is wetted by the foam solution to produce high expansion foam bubbles. This arrangement is substantially different from and much less effective than that of the present application.

5) The '830 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application.

In contrast, the embodiments of the '830 patent include a catalyzing unit, made of a mesh of metal wire would closely around a rotatable support, a structure substantially different from the diffuser unit or the plurality of circumferentially arrayed nozzle jets, as defined and claimed in the present application.

6) The '989 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. The foam generator of the '989 patent utilizes a foam net, constructed as a perforated cylindrical metal wall, disposed so that water sprayed from nozzles causes the rotation of the fan. Expansion of the foam mixture is facilitated by using the fan to blow the foam mixture through the net, which constitutes a structure substantially different from the present application and much less effective and efficient in producing foam.

7) The '142 patent neither discloses nor suggests all elements of the claims of the subject application. For example, it does not teach or suggest systems or methods including, among other elements, the use of a diffuser unit or a plurality of circumferentially arrayed nozzle jets directed toward the central axis of the housing, as defined and claimed in the present application. In contrast, the liquid agent is supplied directly to a spray nozzle for delivery to a target. Thus the structure and function of this device are substantially different from the present application.

None of the references discussed above, alone or in combination, provide direction or motivation to a person of ordinary skill in the art to combine or modify any of these references in order to arrive at the subject matter covered by the claims of the present application. There is also no suggestion that these references may be modified or combined to arrive at the subject matter of the present application with a reasonable expectation of success. Thus, claims of the present application are not obvious in view of any of the references discussed above, alone or in combination.

Furthermore, representative embodiments of the present application have tremendous advantages over the devices disclosed in the references discussed herein and other traditional devices. The system and method for generating high volume, low pressure foam, as



disclosed in the present application, provides a cost effective and enhanced approach to foam generation because, at least in part, the pump only has to pump water and injected foam without having to overcome large friction losses in a fire hose.

In addition, the foam generated according to the disclosed systems and methods of the subject application is of superior quality. More air is aspirated using the disclosed high volume, low pressure foam generation technology, which produces more and bigger air bubbles due to the availability of more air. Air bubbles which are made of water foam can absorb more heat, take up more room and exclude O<sub>2</sub> faster. Mixed in with the larger bubbles are smaller bubbles which will last a long time, e.g., on a fire scene, and as the bubbles break down with heat and time, more water is advantageously deposited on the grounds.

Moreover, use of the disclosed nozzle systems and associated units have significantly improved control and flexibility in using the disclosed foam generation technology. For example, the operator of the disclosed nozzle system can adjust the amount of air or water right at the nozzle, directly controlling the wetness or dryness of the discharged water/foam mixture. Foam generation can thus be adjusted over a wider range by a single person, allowing that individual to select from a very dry foam, which is excellent for protecting exposures, to a very wet foam, which is generally used in actual fire suppression, to foams therebetween.

### 3. Conclusion

None of the references discussed above disclose or suggest all elements of the claims of the subject application. In addition, none of the references provide direction or motivation to a person of ordinary skill in the art to combine or modify any of these references in order to arrive at the subject matter covered by the claims of the subject application. Therefore, the claims of the present application are neither anticipated by nor obvious over the references. In view of the foregoing, it is believed that all of the pending claims are patentable over the references described above, alone or in combination.

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